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ABSTRACT

An 11-year-old spastic quadriplegic girl functioning at the profound level of mental retardation was exposed to contingent reinforcement for holding her head in an upright position. The subject, who had minimal voluntary movement and had to be properly positioned to inhibit abnormal reflex patterns, was observed while prone over a wedge bolster and while in her adaptive wheelchair. A mercury switch attached to a headband was connected to a cassette tape recorder which played a favorite tape while her head was held up. Though the first position, over a bolster, was judged to be too difficult for her to maintain head control for any period of time, she made significant increases in holding her head up in the wheelchair. When the switch was disconnected, the amount of head upright time decreased, indicating that the music provided motivation for her to attempt independent head control. (CL)

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Maintaining Appropriate Body Positions

Through the Use of a Motivating Electronic Device

Paper presented at The Association for the Severely
Handicapped 10th Annual Conference, November 5, 1983

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During the past decade, legislative and judicial actions have confirmed the right of all children, including those with severe and multiply handicapping conditions, to an appropriate public education. Many of these students have physically handicapping conditions, as well as mental retardation, which interfere with their ability to function independently or in a meaningful way. For those students with abnormal posture, reflexes, or movements, there is a need for them to be positioned and handled throughout the school day to decrease their abnormal responses and to encourage more desirable patterns of head control, arm support, and equilibrium reactions (Utley, Holvoet, & Barnes, 1977).

When children's movements are confined to limited patterns, they may have a difficult time interacting with their surroundings. This not only causes problems with gross motor milestones, such as lifting their head or sitting independently, but also interferes with the children's development of language and cognitive skills (Campbell, Green, & Carlson, 1977). Children who lack head control may be positioned in adaptive chairs or in a prone position over a wedge to make it easier to lift their heads. It is crucial to remember that while proper positioning makes it possible for children to lift their heads, it does not give them a reason to want to do so. There must be some stimulation from the children's environment to encourage the head lifting.

Technology has recently provided us with a means to encourage children to use their motor responses. Zuromski (no date) and others have developed active stimulation devices which use various types of electronic switches to provide positive reinforcement for desired movement. These electronic devices are able to provide immediate visual, auditory, or tactile feedback following a variety of responses (Snell, 1983). The use of various types of switches (tilt, mercury, squeeze, barrel, or pressure pad switches) allows severely handicapped persons to control battery or electronically operated devices like toys, tape recorders, games, or electrical appliances.

In spite of the rapid development of technology which can assist severely handicapped children to move appropriately and be active learners, there is still a paucity of research data to confirm or reject the utility of these procedures. It is the purpose of this paper to discuss data for analyzing some of these devices and procedures; in addition, problems with and benefits from the use of these electronic switches will be discussed.

METHOD

Participant and Setting

The study was conducted in a public school classroom for multiply handicapped students. A section of the room (approximately 6 x 8 feet) was screened off for use during this study. The participant, Lisa, resided in a state developmental

center and was bussed daily to the public school. She was an 11-year-old spastic quadriplegic girl who was functioning at the profound level of retardation, although she was generally considered untestable as a result of her physical and attentional problems. Lisa had minimal voluntary movement and had to be properly positioned to inhibit abnormal reflex patterns; she had very poor head control and usually spent much of the day with her head down. During instruction, Lisa rarely responded and had to be continually prompted to hold her head up, even when positioned correctly.

Target Behavior and Physical Positioning

The behavior being measured was the number of minutes that Lisa held her head up independently during fifteen minutes of unstructured class time each day. This behavior was measured by the physical therapist with Lisa in two positions designated on her Individualized Education Program as appropriate for head control. The first position on which data were collected was prone over a wedge bolster (position #1); the second position was in Lisa's adaptive wheelchair which was adjusted to maintain her body in an aligned and more normalized position (position #2).

Experimental Design and Procedures

A reversal design was employed in order to determine if any changes in the number of minutes Lisa held her head up independently were a result of the experimental intervention.

However, as presented in the results and discussion sections, this design was only implemented for position #2.

During the experimental intervention, a mercury switch was attached to a headband placed on Lisa's head. This switch was connected to a cassette tape recorder so that when Lisa's head was in an upright position, the switch activated the recorder which played a favorite tape of Lisa's for as long as her head was held up. During the baseline phases, Lisa wore the headband; however, it was not connected to the recorder.

Lisa was placed in an appropriate position (all data were collected first on position #1, then on position #2) in a screened off section of the room. She was observed for a fifteen minute period by a graduate student seated where Lisa was not aware of his presence; there was no interaction between the observer and Lisa. A stop watch was started as soon as Lisa held her head up; the watch was stopped when Lisa put her head down. The cumulative amount of time that she held her head up during each data collection session was recorded.

RESULTS

Position #1

During the five session baseline phase, Lisa held her head up independently an average of 3:47 minutes, with a range from 3:10 to 4:16 minutes, during each fifteen minute session. When the mercury switch and cassette were introduced in the six session experimental phase, Lisa held her head up independently

an average of 3:47 minutes, with a range from 3:01 to 4:22 minutes. This intervention was not continued, nor was the reversal design implemented since it was obvious that Lisa was not able to maintain the extended position that was necessary for her to activate the cassette recorder. Figure 1 illustrates Lisa's performance for position #1.

Insert Figure 1 about here

Position #2

During the seven session baseline phase, Lisa held her head up independently an average of 2:49 minutes, with a range from 1:30 to 4:16 minutes during each fifteen minute session. During the first fourteen session experimental phase, Lisa independently held her head up an average of 11:44 minutes, with a range from 6:03 - 13:09 minutes. The reversal design was used for the next four sessions and the cassette recorder was removed. The average time Lisa held her head up during this phase dropped to 6:03 minutes with a range from 3:45 to 10:38 minutes. Finally, the cassette recorder was reintroduced during a final five session experimental phase, and the average number of minutes Lisa held her head up increased to 10:38 minutes, with a range from 8:10 to 12:11 minutes. Figure 2 illustrates Lisa's performance in this position.

Insert Figure 2 about here

DISCUSSION

The results of this investigation illustrate the benefits

of using an electronic switch to encourage independent head control. However, it is also important to note the necessity for appropriate positioning in order for the switch to be effective. The data from Lisa in position #1 seemed to indicate that Lisa did not understand the relationship between her response and the activation of the cassette recorder. However, it had been noted that she was having great difficulty extending and holding herself in the position, so it was decided to resume the study with position #2. In this position, as can be seen from the results, Lisa was able to control her head and increased the amount of time that she held her head up. In addition, when the electronic switch was disconnected from the recorder, the amount of time Lisa held her head up decreased, indicating that the music from the cassette provided the motivation for her to attempt independent head control. Therefore, when using technology such as electronic switches with severely handicapped students, it is important to carefully evaluate their responses, both qualitatively and quantitatively before determining the success or failure of the procedures and equipment.

The use of electronic devices also may provide a way to document the abilities of students who are difficult to assess. While all evaluations of Lisa, from both testing and instructional observations, were very pessimistic about her capabilities, her performance in this study indicated her

ability to understand relationships when provided with adequate motivation. Her abilities were shown without any prompting or teacher interactions; yet, when presented with instructional tasks in structured situations, seldom did Lisa demonstrate her understanding as clearly. This indicates a need to examine the reinforcers used with students during lessons.

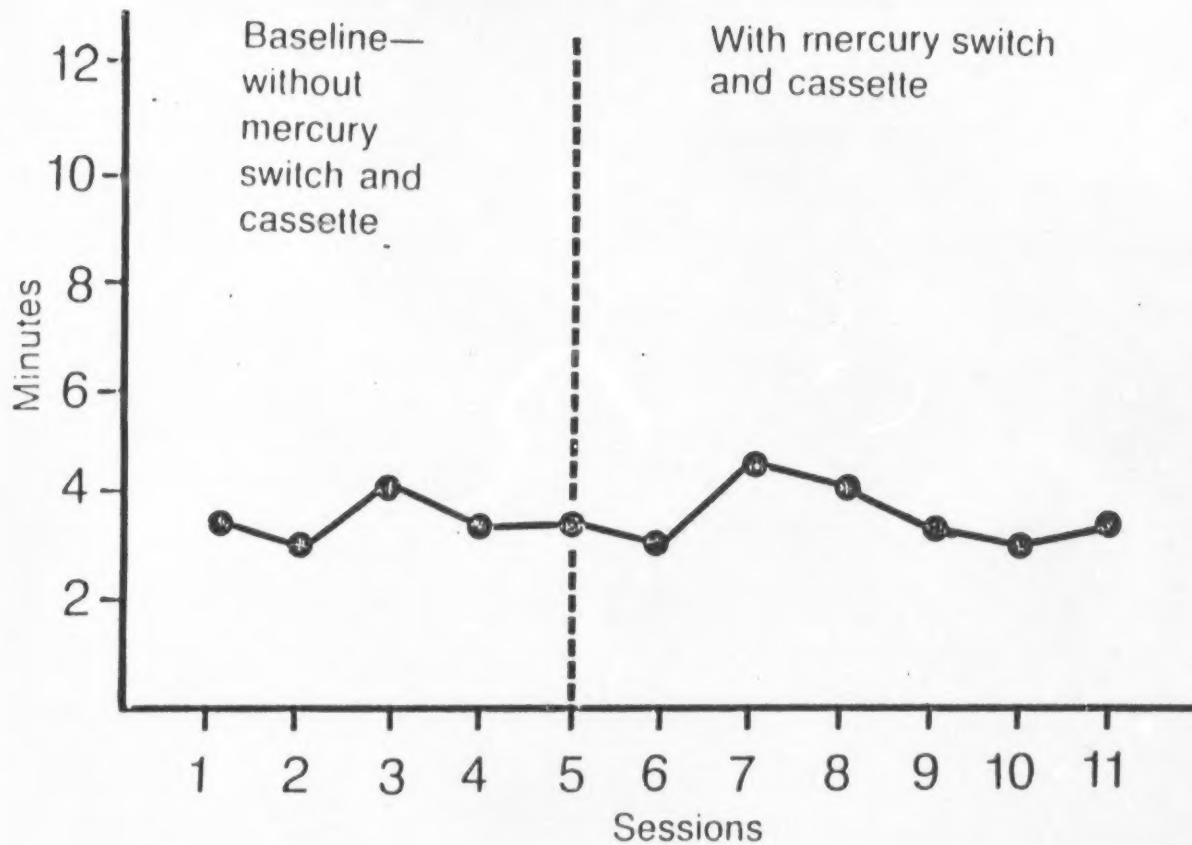
An additional benefit that could be attributed to the use of electronic switches is the higher level of attention and opportunity for stimulation during nonstructured class time. Many students like Lisa, who spend much of their class time in a position where they can not observe their environment, may be encouraged to develop the abilities, such as head control, necessary to attend to environmental stimulation through the use of motivating electronic devices. Once these skills are developed, the students can respond with a higher level of awareness to materials and activities in the room.

While it is obvious that there are many benefits from the use of technology in the classroom, there are also many logistical problems associated with it. The simple problems of arranging all the equipment, power supplies, and adaptive devices can seem overwhelming, and the necessity of monitoring the equipment to insure that it is operating correctly (no dead batteries, no plugs disconnected, etc.) can take time away from other instructional tasks. One difficulty encountered in the preliminary stages of this study was how to keep the mercury

switch in the appropriate position on Lisa's head. Many varied combinations of headbands, clips, and velcro were tried before a satisfactory arrangement was found. These problems and frustrations, while perhaps minor when viewed in relation to the benefits of a successfully established program, may be discouraging to many teachers whose students could use these electronic devices.

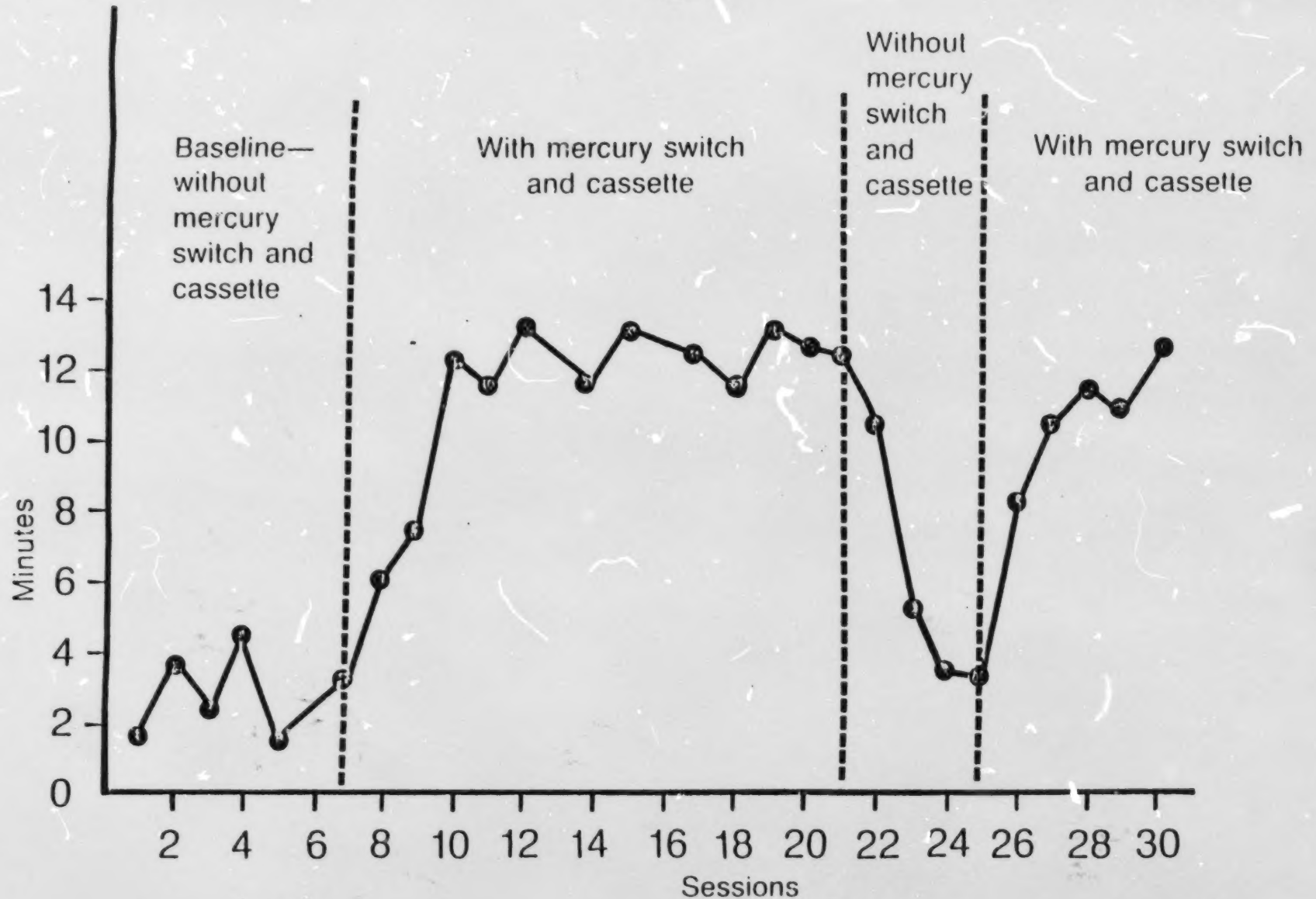
Technology will have an important role in the special education classroom. However, before it will be completely accepted, several changes will have to be implemented. First, teachers need to be provided with training, either at the inservice or preservice levels, on how to use electronic devices in their classrooms successfully. Without this teacher preparation, these electronic devices will join many of the other unused pieces of sophisticated equipment in storerooms or closets in the schools. Second, reports and data, illustrating the use of technology with handicapped children need to be prepared and disseminated to document the value of the equipment and procedures. Research and teacher involvement should assist the use of technology to reach its potential with handicapped children.

FIGURE 1



Number of minutes Lisa independently holds her head up during nonstructured 15 minute periods when positioned in a prone position on a wedge bolster.

FIGURE 2



Number of minutes Lisa independently holds her head up during nonstructured 15 minute periods when positioned in her wheelchair.

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